Available online at www.sciencedirect.com

ScienceDirect

Procedia CIRP 00 (2021) 000–000

www.elsevier.com/locate/procedia

54th CIRP Conference on Manufacturing Systems

Vision-Based Damage Localization Method for an Autonomous Robotic Laser Cladding Process

Habiba Zahir Imam[a], Yufan Zheng[a], Pablo Martinez[a], Rafiq Ahmad[a]*

[a]*Laboratory of Intelligent Manufacturing, Design and Automation (LIMDA), Department of Mechanical Engineering, University of Alberta, 9211 116 Street NW, Edmonton, AB, T6G1H9, Canada*

* Corresponding author. *E-mail address:* rafiq.ahmad@ualberta.ca

Abstract

Currently, damage identification and localization in remanufacturing is a manual visual task. It is time-consuming, labour-intensive. and can result in an imprecise repair. To mitigate this, an automatic vision-based damage localization method is proposed in this paper that integrates a camera in a robotic laser cladding repair cell. Two case studies analyzing different configurations of Faster Region-based Convolutional neural networks (R-CNN) are performed. This research aims to select the most suitable configuration to localize the wear on damaged fixed bends. Images were collected for testing and training the R-CNN and the results of this study indicated a decreasing trend in training and validation losses and a mean average precision (mAP) of 88.7%.

Keywords: Remanufacturing; Deep neural networks; Damage localization; Robot laser cladding; Machine vision; Repair